-- Interim Report --

Contract No. IWM06073

Facilities Data Collection Approach and Results for the Life Cycle Assessment and Economic Analysis of Organic Waste Management and Greenhouse Gas Reduction Options

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Submitted to

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1 Background and Overall Facilities Data Collection Approach

The goal for this project is, broadly, to identify and quantify (to the fullest extent possible) costs, greenhouse gas (GHG) emissions, and potential GHG emission offsets associated with alternatives to manage organic wastes that are currently disposed in landfills at the state and regional levels. One focal point of the project is the development of data to identify and characterize California and California region-specific costs and life cycle assessment (LCA) related data. These data will be used to define key facility design and operating assumptions for each organics management alternative which, according to the project Technical Approach Memorandum, include:

- composting,
- chipping and grinding,
- recycling or material recovery facilities (MRF),
- anaerobic digestion (AD),
- biomass-to-energy (BTE),
- waste-to-energy (WTE), and
- landfill disposal (as a basecase).

In this interim report we detail the overall approach for collecting data on facilities representing these organics management alternatives, a summary of data obtained from the different facilities based on their assumed process ranges, and associated uncertainties and limitations. Additional data collection efforts are ongoing concurrently in the project including compiling existing publicly available sources of data and information and compost application field sampling and analysis. Results from these additional activities are, or will be, documented in other interim project reports.

In general, our overall goal for data collection is to develop high quality, objective, scientifically based data for each organic waste management alternative. This is being accomplished by (1) evaluating data gaps after compiling the survey data, (2) obtaining additional data from publicly available sources and (3) selecting the best data to serve the goals of the LCA and economic analyses.

The survey data obtained from the different facilities are presented by management alternative/facility type, study region (Greater Los Angeles [GLA] region[1], South Central Valley [SCV] region[2], Southern Bay [SBA] region[3], and the entire State), and by their relation to the LCA/GHG or economic part of the project. **Table 1** summarizes the status of the data collection at the time of this report.

[1] Greater Los Angeles (GLA) region includes the counties of Los Angeles, Orange, Riverside, and San Bernardino.
[2] Southern Central Valley (SCV) region includes the counties of Fresno, Kern, Kings, Madera, and Tulare.
[3] Southern Bay (SBA) region includes the counties of Alameda, Contra Costa, San Francisco, San Mateo, and Santa Clara.

Table 1. Summary of Data Survey Results.

Regions	Status	Management alternatives						
		Composting	**Chipping/ Grinding**	**Recycling**	**AD**	**BTE**	**WTE**	**Landfill**
GLA	**Completed survey**	0	2 (no LCA/GHG data)	2 (no LCA/GHG data)	0	0	0	4
	Declined participation	0	0	2	0	1	0	0
	Pending or No Response	5	2	9	1	0	2	5
	Unable to contact	0	0	4	0	0	0	0
	TOTAL	**5**	**4**	**17**	**1**	**1**	**2**	**9**
SBA	**Completed survey**	1 (no LCA/GHG data)	0	2	1 (no LCA/GHG data)	None	None	0
	Declined participation	1	0	1	0			1
	Pending or No Response	2	1	5	0			3
	Unable to contact	0	0	4	0			1
	TOTAL	**4**	**1**	**12**	**1**	**0**	**0**	**5**
SCV	**Completed survey**	1 (no LCA/GHG data)	0	0	0	0	None	1
	Declined participation	1	0	1	1	4		1
	Pending or No Response	1	0	4	0	2 (1 facility is closed)		7
	Unable to contact	0	0	3	0	1		0
	TOTAL	**3**	**0**	**8**	**1**	**7**	**0**	**9**
Other Regions	**Completed survey**	2	1 (no LCA/GHG data)		1 (no cost data)	1	0	None
	Declined participation	0	0		0	2	0	
	Pending or No Response	2	0		0	20	1	
	Unable to contact	0	0	3	0	0	0	
	TOTAL	**4**	**1**	**3**	**1**	**23**	**1**	**0**
TOTAL ALL REGIONS		**16**	**6**	**40**	**4**	**31**	**3**	**23**

Notes: None = no facilities were identified; Pending response= these are facilities that have promised data; Unable to contact= this means that we could not get anybody to return our calls or e-mails.

As indicated in **Table 1**, the response to the data survey has been limited. This is due primarily to confidentiality concerns with respect to the financial data (despite the fact that a confidentiality agreement was offered) and time constraints. Consequently, a significant portion of data to the complete the LCA and economic analysis will come from publicly available sources. In addition to the information in **Table 1,** the project team is currently following up with facilities regarding survey data questions and is waiting for reply from several facilities as indicated in the data tables presented in the following sections.

The data collection approach varies depending on the management alternative/facility type. The specific approaches by management alternative/facility type are described in **Sections 2 through 7** of this memorandum.

Initially, an evaluation of publicly available data was performed and included creating comprehensive lists of facilities for each management alternative in the study regions. After a master list of facilities was created, criteria were developed to determine which facilities should be contacted as part of a data collection survey. The facilities selection criteria varied by management alternative and included the:

- percentage of total waste managed by each facility as part of a given region and the State for landfill and BTE facilities;
- geographical location (e.g., making sure that each of the counties in a given region is represented if possible);
- facility size and type (e.g., attempted to reflect a mix of facility type and size for composters and recyclers); and
- likelihood of obtaining responses considering previous work that the Board and the project team have developed.

The results of this evaluation defined the next steps. For example, when numerous facilities were identified for a given alternative, an additional up-front effort was made to determine data availability. Readily available data were compiled and data gaps were identified for the data collection survey.

The data collection survey consisted of contacting a selected list of facilities from each management alternative and asking them to respond to an electronic questionnaire. Initially, phone calls were made to each of the selected facilities to gauge interest and availability to participate in the data collection survey. Depending on the initial response, an e-mail was sent with a participant introduction letter and the relevant questionnaire. Follow-up calls were made a week or so after the initial contact, making sure that the information was received and to confirm participation. Facilities were given the flexibility to provide information in different formats and a confidentiality agreement was offered. Communication with the facilities was closely tracked and records were saved in the project files. The records include explanations on why information was not received from a given facility. Board staff provided feedback on the initial list of facilities to be contacted, provided suggestions for additional facilities to contact, and facilitated communication with staff at various facilities.

The following sections are organized by management alternative and present descriptions of the type of information that was requested and received from the facilities. Note that in this

report, the results of the data collection survey are merely presented. Actual data used for the LCA and economic analyses may differ to best represent state and regional averages, particularly in cases where data from only one facility was obtained.

2 Composting and Chipping/Grinding

California has a well-developed infrastructure of both composting and chipping/grinding facilities. It was expected that most of the data from these facilities could be gathered using the data collection survey. Although there are a variety of feedstocks composted, we focused on the primary feedstocks in California, green material and wood material. Chipping/grinding facilities accept both green material and wood material and access a number of end use markets including BTE, mulch, and alternative daily landfill cover (ADC). Most composting facilities also access the BTE and mulch markets, and some access the ADC "market".

A typical composting facility in California has an outdoor windrow operation using largely portable diesel-powered equipment. The material received by the composters is processed (largely by diesel-powered grinders), formed into a windrow, turned (using portable diesel-powered equipment) and screened prior to sale. A typical facility will accept both green material and wood waste often from residential curbside programs and an increasing number of composting facilities in California are beginning to accept food scraps from residential curbside programs, as well as from dedicated commercial routes or large generators. In the future, there will likely be an increase in aerated static pile type compost operations due to air emission requirements.

Chipping/grinding facilities are more challenging to characterize. Although there are a few stand-alone chipping/grinding facilities, most are associated with landfills, transfer stations, or material recovery facilities. A facility typically consists of a large diesel-powered grinder (either tub-type or horizontal with a few electrical models).

We identified 50 composting facilities and over 185 chipping/grinding facilities (**Table 2.1**) as potential candidates for this study. Composting facilities are easier to track and/or verify since they require large amounts of land and a permit from the CIWMB. While dedicated chipping/grinding facilities typically require a permit from the CIWMB, some landfills, MRFs, and transfer stations rely on periodic contract grinding, which usually does not require a permit and can be much harder to track and/or verify. From a comprehensive list of candidate facilities, some were excluded. For example, biosolids composting facilities were excluded, as were composting facilities that compost predominantly manure or agricultural residues. Although we recognize that a number of these types of compost facilities exist, in order to limit the complexity of the project we only considered predominately MSW composting facilities.

Table 2. Potential Composting and Chipping/Grinding Facilities by Region.

Region	Composters	Chippers & Grinders	Total
SBA	7	31	38
SCV	16	27	43
GLA	37	67	104
Total	60	125	185

A smaller subset that was deemed likely to participate in the study was created and 22 potential California-based composting and/or chipping and grinding facilities were identified as candidates for this study.

Greater Los Angeles Region

Los Angeles County:

- Calabasas Landfill, Los Angeles (C/G)
- Griffith Park Composting Facility, Los Angeles (Compost)
- Harbor Composting Facility, Los Angeles (Compost and C/G)
- Lopez Canyon Environmental Center, Los Angeles (Compost)
- Puente Hills Landfill, Los Angeles (C/G)

Confidential Facility 4

Southern Bay Area Region

Alameda County:

- Davis Street Transfer Station, San Leandro (C/G)

County of Santa Clara:

- City of Palo Alto, Palo Alto (Compost)
- Newby Island, Milpitas (Compost)
- Z-Best Composting, Sunnyvale (Compost)

South Central Valley Region

Kern County:

- Community Recycling, Lamont (Compost)
- Mt. Vernon Ave Recycling and Composting Facility, Bakersfield (Compost)

Kings County:

- Kings Waste & Recycling Authority, Hanford (Compost, facility is closing)

Not in Study Regions

County of Merced:

- Merced County Compost Facility (Hwy 59 site), Merced (Compost)
- Merced County C&G Facility (Hwy 59 site), Merced (C&G)

Solano County:

- Jepson Prairie Compost Facility, Vacaville (Compost)

Stanislaus County:

- City of Modesto, Modesto (Compost)
- Grover Landscape Services Inc., Vernalis (Compost)

Confidential Facility 1
Confidential Facility 2
Confidential Facility 3

As of the date of this memorandum, 2 facilities had declined to participate, 13 had not responded to the data request and 7 had provided completed or partially completed surveys. Among the facilities that provided data, 4 are composting facilities and 3 are chipping/grinding facilities that did not provide LCA/GHG related data.

2.1 LCA/GHG Related Data

Table 2.1.1 presents the facility-provided data obtained to date. Composting data was provided by facilities outside of the designated study areas and no LCA/GHG data was provided for any chipping/grinding facilities.

Table 2.1.1. Data Obtained for Composting Operations.

Category Description (1)	Units	Low Range	Average	High Range	Comments
Outside					
Compost Facility Design	windrow or aerated pile	n/a	n/a	n/a	2 Windrow
Compost Residency Time	days	90	228	365	
Compost Pile Turning Frequency	days	3	4	5	
Curing Stage Residence Time	days	30	60	90	
Fuel/energy Requirements for the Windrow Turner	HP gal/yr	425 HP 9.27 gal/hr	n/a	435 HP 6,000 gal/yr	Diesel. Additional information has been requested to estimate a low range in gal/yr.
Fuel/energy Requirements for the Hammerrmill	gal/yr	5,255 gal/yr	1050 HP 8,628	12,000 gal/yr	Diesel. HP based on data provided by one facility.
Fuel/energy Requirements for the Pre-trommel	gal/yr	1,466 gal/yr	97 HP 2,053	2,640 gal/yr	Diesel. HP based on data provided by one facility.
Fuel/energy Requirements for the Front End Loader	HP gal/hr	149 HP 2.58 gal/hr	2.93 gal/hr	230 HP 3.27 gal/hr	Diesel.
Percentage of Incoming Waste Landfilled	percent	8	9	10	
Transportation Distance to Residuals Disposal	miles	n/a	n/a	n/a	Information has been requested in follow-up questions.

Notes:
(1) Based on information obtained from completed surveys of four facilities.
n/a = not available.

Data collection efforts from composters and chipping and grinding facilities continued through the date of this memorandum. Detailed economic data from the three facilities that provided data can be found in Appendix A.

2.2 Economic Data

Detailed capital and operating cost data, as well as facility operational data were requested via the data survey. The survey requested a number of cost items including initial capital cost, annual renewals and replacements or depreciation, labor costs, materials and supplies, energy costs, taxes, annual debt service costs and other cost items, where applicable. In many cases it may be difficult to determine capital costs as some facilities are part of much larger operations. In addition, information on revenues, costs savings and potential region-specific cost drivers, either quantitative or qualitative, was requested.

Additional data collection efforts included meeting with some of the composters directly and obtaining some economic and operating data from them. These efforts continued through the date of this memorandum.

Table 2.2.1. summarizes the cost data obtained with the data collection survey as of the date of this memorandum. No economic data was obtained for chipping/grinding facilities.

Table 2.2.1. Data Obtained for Composting.

Category Description (1)	Low Range	Average	High Range	Comments
Annual Tons Composting Waste Processed	37,000	123,000	198,000	
Operating Revenues/ Ton of Composting Waste	$0.5	$5	$13	
Total Revenues/ Ton of Composting Waste	$2	$10	$18	Includes revenues from tip fees, sale of compost and other green products and co-generation fuel sales.
Operating Cost/Ton of Composting Waste (2)	$15	$22	$25	Key drivers include labor and facilities and equipment leases.
Annual Equipment Expenditure/ Ton of Composting Waste	$2	$5	$7	Based on data available for two facilities.
Annual Facility Improvement and Upgrades/Ton of Composting Waste	$1	$3	$4	Based on data available for two facilities.

Notes:
(1) Based on information obtained from a survey of three facilities.
(2) Operating costs exceeded revenues for two out of three facilities.

3 Recycling

As described in the project Technical Approach Memorandum, in addition to organics, traditional recyclables including paper, plastic, glass and metal are included in this study, whereas electronics and special, mixed and household hazardous wastes are excluded. Recyclables, as defined in this study, make up approximately 38 percent of California's waste stream.

The project team is recommending that four categories of recycling processing facilities be modeled: large, highly automated MRFs; small, highly labor-intensive MRFs, a commercial self-bale and self-haul operation, and construction and demolition (C&D) MRFs. Reasons for this recommendation include:

- An assumption that the majority of increased recycling tonnages will pass through one of these facility types;
- An assumption that the other recycling facility types not explicitly modeled can be approximated by model users as one of the four modeled types; and
- The large number of facility types would be impossible to model separately given the project resources and would not add value to the model results.

Forty potential California-based recycling facilities were identified as candidates for this study. As of the date of this memorandum, 4 had declined to participate, 32 had not responded to the data survey and 4 had provided data. Of the 4 facilities that provided data, 3 are medium to large, highly automated multi-material MRFs and 1 facility is a small, highly labor intensive multi-material MRF. The following is a list of recycling facilities contacted.

Greater Los Angeles Region

Los Angeles County:

- Central LA Recycling Center & TS, Los Angeles
- City Fibers, Los Angeles - Large MRF
- Construction & Demolition Recycling, South Gate - C&D
- Culver City Transfer Station & Recycling, Culver City
- DART Facility, Downey - Multi-Material MRF
- Downtown Diversion, Los Angeles
- Master Recycling Center, El Monte - Small to mid-sized MRF
- Puente Hills MRF, Whittier
- Smurfit-Stone, Los Angeles
- Sun Valley Paper Stock, Sun Valley - Paper MRF

Orange County

- CVT Regional MRF, Anaheim - Combined MRF/Mixed Waste Processing
- Rainbow Transfer/Recycling Company, Huntington Beach
- Stanton Recycling and Transfer Station, Stanton
- WM Orange, Orange

County of Riverside

- Southern California Recycling, Santa Monica

County of San Bernardino

- West Valley MRF - Fontana - Midsized, automated MRF and C&D

- Victor Valley MRF, Victorville - Small to mid-sized MRF

Southern Bay Area Region

Alameda County:

- ACI, San Leandro
- Berkeley Recycling Center, Berkeley
- California Waste Solutions, Oakland - Large, highly automated MRF
- Davis Street, San Leandro - Large MRF and separate C&D facility
- Fremont Recycling and Transfer Station, Fremont - Small MRF and C&D

Contra Costa County:

- Brentwood Solid Waste Transfer Station, Brentwood - Large Volume Transfer/Processing Facility
- Central Processing Facility, Richmond - Large Volume Transfer/Processing Facility

County of San Francisco:

- Recycle Central at Pier 96, San Francisco - Very large, automated MRF

San Mateo County:

- South Bayside Integrated Facility, San Carlos - Small, automated MRF
- South San Francisco Scavenger Company, South San Francisco - New collection fleet and MRF

County of Santa Clara:

- Newby Island, Milpitas - Large MRF and C&D facility
- SMART Station (Palo Alto, Mountain View, and Sunnyvale) - Large MRF and C&D

South Central Valley Region

County of Fresno:

- Cedar Ave Recycling & Transfer Station, Fresno
- Kroeker, Inc., Fresno
- Rice Road Recyclery, Fresno - Small MRF and C&D
- Sunset Wastepaper MRF& Transfer Station - Fresno

County of Kings:

- Kings Waste & Recycling Authority (KWRA) MRF, Hanford

County of Kern:

- Kern Valley Recycling and Transfer Station, Kern Valley - Large Volume Transfer/Processing Facility
- Mt Vernon Ave Recycling & Composting Facility, Bakersfield - Large Volume Transfer/Processing Facility

Tulare County:

- Tulare County Recycling, Visalia

Not in Study Region

San Joaquin County:

- Central Valley Waste Services, Lodi
- USA Waste of CA, Stockton - MRF and C&D

Stanislaus County:

- Gilton Resource Recovery, Modesto

3.1 LCA/GHG Related Data

The data collection survey focused on defining the basic design and operating characteristics of California recycling processes. **Table 3.1.1** presents the facility-provided data obtained to date.

Table 3.1.1. Data Obtained for Recycling.

Category Description	Units	Low Range	Average	High Range	Comments
SBA Region (1)					
MRF Design	Type	Presorted Mixed waste			
Separation Efficiencies (2)	Percent	97.6 presorted	98.8	100 mixed waste & presorted	
Fuel/Energy Consumption	kWh/yr	n/a	11,030 presorted	n/a	Based on data provided by one facility.
Amount of Residuals	Tons/yr	480 presorted	43,873	87,265 mixed waste & presorted	
Transportation Distance to Residuals Disposal	Miles	0.13 presorted	13.6	27 mixed waste & presorted	

Notes:
(1) Based on information received from two completed surveys.
(2) Separation efficiency refers to the recovery of a specific recyclable from a commingled waste stream after undergoing manual and/or mechanical separation.
n/a = not available.

3.2 Economic Data

Material tonnages and capital and operating cost data were requested via the data collection survey. The survey was specific for a number of cost items including initial capital cost, annual renewals and replacements or depreciation, labor costs, materials and supplies, energy costs, taxes, annual debt service costs and other cost items, where applicable. In addition, information on revenues, costs savings and potential region-specific cost drivers, either quantitative or qualitative, was requested.

We were only able to obtain detailed cost and operating data from a small number of facilities and programs due to concerns over confidentiality, time and/or a lack of readily available detailed cost information. The data collection survey included contacts with local government agencies to seek publicly available operating and cost data on processing facilities,

assistance in securing participation from local facility owners/managers and general input on the study. Private entities were contacted and offered the option of participating in the survey and entering into a confidentiality agreement to keep their responses secure.

Table 3.2.1. summarizes the cost data obtained with the data collection survey as of the date of this memorandum. Detailed economic data from the four facilities that provided data can be found in Appendix B.

Table 3.2.1. Data Obtained for Recycling.

Category Description (1)	Low Range	Average	High Range	Comments
Annual Tons Recycled Waste Processed	19,000	180,000	340,000	
Operating Revenues/ Ton of Recycled Waste	$22	$29	$36	
Total Revenues/ Ton of Recycled Waste	$6	$59	$201	Includes revenues from tip fees, sale of recyclables materials and fees for providing sorting and diversion services for agencies.
Operating Cost/Ton of Recycled Waste (2)	$45	$91	$204	Key drivers include labor, contract payments and depreciation.
Capital Cost/Ton of Recycled Waste	$66	$191	$473	Based on data available for all four facilities.
Annual Equipment Expenditure/ Ton of Recycled Waste	$2	$3	$4	Based on data available for two facilities.
Annual Facility Improvement and Upgrades/Ton of Recycled Waste	n/a	$9	n/a	Based on data provided by one facility.

Notes:
(1) Based on information obtained from four facilities; two reported two years of data for a total of six years of data.
(2) For all facilities reporting, operating costs exceeded revenues.
n/a = not available.

4 Anaerobic Digestion

The data collection approach for AD technology was driven by the general lack of California-based AD facilities using organic material as the predominant substrate. Nearly all of the AD facilities in California are located at wastewater treatment plants. It is estimated that there are 137 wastewater treatment plants utilizing this technology with an estimated excess

capacity of approximately 15 to 30 percent. [4] A few of these facilities supplement their operations with other types of organic waste. The UC Davis Biogas Energy Demonstration Plant is the only stand-alone facility constructed for acceptance of organic waste. While the current state of AD technology in California was generally known at the outset of this project, efforts were made to contact the few AD facilities in the study regions that were incorporating organic material in the substrate.

We identified 4 potential California-based AD facilities as candidates for this study. Due to the small number of facilities, we are not specifically identifying regions.

- Inland Empire Utilities Agency – WWTP and AD
- EBMUD/Norcal Waste Systems, Inc. – WWTP and AD
- Valley Fig Growers – WWTP and AD
- UC Davis Pilot Project – AD

As of the date of this memorandum, 1 had declined to participate; 1 had not responded to the data survey and 2 provided data.

4.1 LCA/GHG Related Data

Table 4.1.1. summarizes LCA/GHG related data obtained from the data collection survey of AD facilities. To date, only one facility has provided LCA/GHG related data.

4.2 Economic Data

Operating information and capital and operating cost data were requested via a data collection survey. The survey was specific for a number of cost items including initial capital cost, annual renewals and replacements or depreciation, labor costs, materials and supplies, energy costs, residue disposal costs, taxes, annual debt service costs and other cost items, where applicable. In addition, information on revenues from the sale of energy and/or compost, costs savings and potential region-specific cost drivers, either quantitative or qualitative, was requested.

Table 4.2.1. summarizes the cost data obtained with data collection survey as of the date of this memorandum.

[4] U.S. Environmental Protection Agency Region 9 and EBMUD. Turning Food Waste into Energy at the East Bay Municipal Utility District: Investigating the Anaerobic Digestion Process to Recycle Post-Consumer Food Waste. March 2008. Available at http://www.epa.gov/region09/waste/organics/ad/EBMUDFactSheet.pdf.

Table 4.1.1. Data Obtained for Anaerobic Digestion.

GHG Category Description (1)	Units	Information Provided	Comments
Type of Product Obtained	Biogas, compost, or liquid nutrients	Compost and Liquid Nutrients.	Compost is not a finished product and is sent to off-site composting facility.
Composition and Percentage of Incoming Waste Recovered for Recycling	Type and percent	1. Paddle Finisher Reject: 10% to 50% (wet weight) to be sent to compost 2. Digested/Dewatered Food Waste: 20% for ADC and land application	
Percentage of Waste as AD Throughput	Percent	100	This is a goal and not an actual achieved value.
Percentage of Total Solids	Percent	1. Food waste: 20% to 40% 2. Rejects: 15% to 30% 3. Digested/Dewatered Food Waste: -21%	
Conversion Efficiency of Waste Biological Volatile Solids (BVS)	Percent	80	
Energy Recovery Efficiency	Percent	Engine Efficiency: 30% (measured) Thermal Efficiency: 30% (estimated)	
Material Recovery Rates	Percent	1. Paddle Finisher: 50% to 90% 2. Digested/Dewatered Food Waste: 80%	
Internal Power Load (e.g., electricity or heat)	Percent	90	For the AD process only.
Percentage of Exported Power (e.g., electricity or heat)	Percent	0	
Transportation Distance	Miles	1. Reject: 57 miles to compost 2. Digested/Dewatered Food Waste: 43 miles to ADC; 131 miles to land application; 57 miles to compost	

Table 4.2.1. Data Obtained for Anaerobic Digestion.

Category Description (1)	Low Range	Average	High Range	Comments
Annual Tons Anaerobic Digestion Waste Processed	26,000	31,000	36,000	
Operating Revenues/ Ton of Anaerobic Digestion Waste	$32	$33	$33	
Total Revenues/ Ton of Anaerobic Digestion Waste	$53	$54	$54	Includes revenues from tip fees and energy sales.
Operating Cost/Ton of Anaerobic Digestion Waste	n/a	$22	n/a	Based on data provided by one facility.
Capital Cost/Ton of Anaerobic Digestion Waste	$154	$219	$284	

Detailed economic data from the two facilities that provided data can be found in Appendix C.

5 Biomass-to-Energy

For the purposes of this study, BTE facilities were defined according to the CIWMB "biomass conversion" definition in the Public Resources Code Section 40106 [5] as facilities exclusively burning organic material. According to this definition, there are 31 BTE facilities in CA, 7 of them in the GLA and SCV regions were identified, while no facilities were identified in the SBA region. The list of facilities was obtained from the 2008 CA Energy Commission, Power Plants Database. This database presents the most complete and up-to-date information. For example, other sources such as the CIWMB's Biomass to Energy site (http://www.ciwmb.ca.gov/Organics/Conversion/BioEnergy/) presents the number of facilities operating in the State in year 1999 and the California Biomass Energy Alliance (http://www.calbiomass.org/county.htm) lists their member facilities in year 2006.

The project team initially implemented a data collection survey of the BTE facilities in the regions and facilities generating more than 5% of the biomass-generated energy in the State (the largest facilities) and the Board provided additional facility suggestions after many facilities declined to participate. The following is the initial list of facilities considered and contacted:

Greater Los Angeles Region

Riverside County

- Colmac Energy Mecca LF II, Mecca

South Central Valley Region

Fresno County

- Covanta Mendota Biomass, Mendota
- Dinuba Energy Inc., Reedley
- Rio Bravo Fresno, Fresno

[5] CIWMB "biomass conversion" definition in the Public Resources Code Section 40106 (http://www.ciwmb.ca.gov/lgcentral/basics/transform.htm).

- Rio Bravo Rocklin, Fresno

Kern County
- Covanta, Delano Inc., Delano

Kings County
- Dinuba Energy Inc. in Kings County

Madera County
- Madera Power LLC, Firebaugh

Tulare County
- Sierra Power Corp., Terra Bella

Not in Study Regions

Butte County
- Covanta, Pacific Oroville, Oroville

Colusa County
- Wadham Energy LP, Williams

Humboldt County
- Fairhaven Power Co., Eureka
- Pacific Lumber Co., Scotia

Imperial County
- Mesquite Resource Recovery Project, El Centro

Lassen County
- Covanta, Mt. Lassen Power, Westwood
- Honey Lake Power Company, Wendel

Monterey County
- Soledad Energy, Soledad

Placer County
- Sierra Pacific Industries SPI-Lincoln, Redding

Plumas County
- Collins Pine Co. Project, Chester

San Joaquin
- Diamond Walnut Growers Inc., Stockton
- Tracy Biomass Plant, Tracy

Shasta County
- Wheelabrator Shasta, Shasta Energy, Anderson
- Delwest Saw Mill Cogen, Burney Forest Power, Burney
- Covanta Burney Mountain Power, Burney

Tuolumne County
- Covanta, Pacific Ultrapower Chinese Station, Sonora

Yolo County
- Woodland Biomass Power Ltd., Woodland

A total of 31 facilities within and outside the study regions have been contacted. To date, only 1 facility has provided data, 6 facilities have declined participation, and 22 facilities have not responded to the data request. The following sections provide additional information on the data collection approach and status.

5.1 LCA/GHG Related Data

The identified BTE facilities process biogenic material that includes wood-waste from forest brush and clearing; agricultural operations, including rice byproducts and animal waste; C&D debris; yard waste and waste from mill operations. **Table 5.1.1** presents the facility-provided LCA/GHG data obtained to date.

Table 5.1.1. Data Obtained for Biomass-to-Energy.

Category Description (1)	Information Provided	Comments
Outside		
Type of Combustion Technology	Stocker fired traveling grate furnace	
Type of Energy Produced	1250 PSI Steam	
Type and Efficiency of Energy Recovery System	Turbine 40,000 kW, 13.8 kV generator	
Type of Energy Offset	Electricity sold to the grid	
Overall Combustion System Efficiency	89%	
Type and Amount of Fuels Used in Addition to Biomass	Propane, less than 1% per year	
Ash Management	Used as a soil amendment and landfilled, bottom ash always goes to a landfill.	
Transportation Distance to Residuals Disposal	40 miles	
Notes: (1) Information provided is based on one survey.		

5.2 Economic Data

Economic data for BTE facilities are similarly separated into capital and operating costs as described for previous management alternatives. The survey was specific for a number of cost items including initial capital cost, annual renewals and replacements or depreciation, labor costs, materials and supplies, energy costs, taxes, annual debt service costs and other cost items, where applicable. Diversion-specific costs and revenues include costs to manage the ash and residue and any revenues received from energy sales. In addition, information on costs savings and potential region-specific cost drivers, either quantitative or qualitative, was requested.

Table 5.2.1. summarizes the cost data obtained with the data collection survey as of the date of this memorandum.

Table 5.2.1. Data Obtained for Biomass-to-Energy.

Category Description (1)	Low Range	Average	High Range	Comments
Annual Tons Biomass-to-Energy Waste Processed	n/a	107,000	n/a	
Total Revenues/ Ton of Biomass-to-Energy Waste	n/a	$122	n/a	Includes revenues from energy sales, firm capacity payments and CEC renewables funding.
Operating Cost/Ton of Biomass-to-Energy Waste	n/a	$128 (2)	n/a	Key drivers include labor, depreciation, maintenance and fuel costs.

Notes:
(1) Based on information obtained from one facility.
(2) Calculated; reported total operating expenditures were less than revenues however there was a numerical error in the reported data.
n/a = not available.

Detailed economic data from the one facility that provided data can be found in Appendix D. Much of the economic data for these facilities will be derived from publicly available data sources.

6 Waste-to-Energy

For the purposes of this study, WTE facilities were defined according to the CIWMB "Transformation Diversion Credit" [6] as facilities burning solid waste to produce heat or electricity, excluding operations that exclusively burn organic materials, which will be included under BTE facilities. According to this definition, 3 WTE facilities in CA will be considered for this analysis.

The following facilities have been contacted:

Greater Los Angeles Region

Los Angeles County
- Commerce Refuse to Energy Incinerator, Whittier
- Southeast Resource Recovery Facility (SERRF), Long Beach

Not in Study Region

Stanislaus County
- Covanta Stanislaus Inc., Crows Landing

The following sections provide additional information on the data collection approach and status.

6.1 LCA/GHG Related Data

Combustion is a management practice used for the full spectrum of materials in the solid waste stream. The identified WTE facilities process material that includes MSW, wood waste,

yard waste, C&D debris, contaminated soil, ash, dry industrial waste, non-friable asbestos, and tires.

No preliminary LCA/GHG data have been collected as of the date of this memorandum. The following questions were included in the data collection survey in relation to the estimation of GHG emissions:

- What is the overall combustion system efficiency?
- What is the ferrous recovery rate?
- Do you use other fuels in addition to MSW? If yes, please indicate the fuels and amounts you use.
- How is the ash managed?

6.2 Economic Data

None of the three facilities provided cost data through the date of this memorandum. Therefore, the economic data for these types of facilities will be derived from publicly available data sources.

7 Landfill

Landfill disposal is being used as the baseline alternative in this project against which the other organic management alternatives will be assessed. There are a total of 155 landfills located in California (76 in the three study regions) and all were considered for the data collection effort. The number of landfill facilities corresponds to those reported in the CIWMB's Disposal Reporting System (http://www.ciwmb.ca.gov/lgcentral/DRS/Reports/default.asp) as operational in the year 2006, the baseline year for this analysis. These landfills manage different types of waste including: MSW, wood waste, yard waste, C&D debris, asphalt, concrete, cement, sludge, contaminated soil, dry industrial waste, non-friable asbestos, tires, waste carpet material, white goods, and bulky wastes. The list of landfills was confirmed after reviewing the information presented in the CIWMB Solid Waste Information System database and information from the U.S. Environmental Protection Agency's (U.S.EPA) Landfill Methane Outreach Program (LMOP) Database 2006 Version. A portion of the waste in this analysis is exported to facilities in other counties and States, which were not included in the data collection survey.

Considering the large number of landfill facilities in the State of California, the data collection consisted of (1) a review of publicly available sources and (2) a data collection survey of landfill facilities managing more than 10% of the waste (the largest facilities) from each region and the State. This last step was used to confirm and/or supplement information from publicly available sources, but the data provided by the facilities was preferred. The following is the list of facilities that have been contacted:

Greater Los Angeles Region

Los Angeles County
- Puente Hills Landfill, Whittier

Orange County
- Frank R. Bowerman Landfill, Irvine
- Olinda Alpha Landfill, Brea

Riverside County
- El Sobrante Landfill, Corona

San Bernardino County
- Colton Sanitary Landfill, Colton
- Landers Sanitary Landfill, Landers
- Victorville Sanitary Landfill, Victorville
- San Timoteo Sanitary Landfill, San Timoteo

San Francisco Bay Area Region

Alameda County
- Altamont Landfill, Livermore
- Vasco Road Landfill, Livermore

Contra Costa County
- Keller Canyon Landfill, Pittsburg

Santa Clara County
- Newby Island Landfill Phases I, II, & III, Milipitas

San Mateo County
- Ox Mountain Landfill, Half Moon Bay

South Central Valley Region

Fresno County
- American Avenue Disposal Site, Kerman

Kern County
- Bakersfield Metropolitan (Bena) Landfill, Edison

Kings County
- Avenal Regional Landfill, Avenal
- Chemical Waste Management, Inc. Unit B-17, Kettleman
- CWMI, KHF (MSW Landfill and B-19), Kettleman

Madera County
- Fairmead Solid Waste Disposal Site, Chowchilla

Tulare County
- Visalia Disposal Site, Visalia
- Teapot Dome Disposal, Porterville
- Woodville Disposal Site , Visalia

Little data have been obtained to date for landfill facilities. Only 4 of the 22 facilities contacted have completed the survey. Two facilities have declined to participate, 2 could not be contacted, and the remaining facilities have not responded as of the date of this memorandum. The following sections provide additional information on the data collection approach and status.

7.1 LCA/GHG Related Data

Table 7.1.1. presents the landfill facility-provided LCA/GHG data obtained to date.

Table 7.1.1. Data Obtained for Landfills.

Category Description	Units	Low Range	Average	High Range	Comments
GLA Region (1)					
Landfill Gas Collection System Efficiency	Percent	75	79	83	
Landfill Gas Management System	Vent, Flare, Energy Recovery	Vent: 1 Flare: 2 ER: 2			
Landfill Total Gas Yield Potential	ft^3 gas/ton MSW	2,011	3,206	4,400	
Landfill Gas Quality Carbon Dioxide	Percent	28	35	42	
Landfill Gas Quality Methane	Percent	32	39.5	47	
Type of Energy Recovery System	Turbine, Boiler, ICE	None (1), ICE (1), Steam turbine/gas turbine/ICEs			
Efficiency for Energy Conversion in ICE	Percent	n/a	n/a	n/a	
Distance Leachate is Transported for Treatment	Miles	0	16	32	
SCV Region (2)					
Landfill Gas Collection System Efficiency	Percent	n/a	99.8	n/a	Based on data provided by one facility.
Landfill Gas Management System	Vent, Flare, Energy Recovery	Flare			
Landfill Total Gas Yield Potential	ft^3 gas/ton MSW	n/a	600	n/a	
Landfill Gas Quality Carbon Dioxide	Percent	n/a	42	n/a	
Landfill Gas Quality Methane	Percent	n/a	57	n/a	
Type of Energy Recovery System	Turbine, Boiler, ICE	None			
Transportation Distance for Leachate Treatment	Miles	n/a	12.15	n/a	

Notes:
(1) Information based on four completed surveys.
(2) Only one survey was completed for the SCV Region.
n/a = not available.

7.2 Economic Data

Capital and operating cost data were requested via a data collection survey. The survey was specific for a number of cost items including initial capital cost, annual renewals and replacements or depreciation, labor costs, materials and supplies, energy costs, taxes, annual debt service costs and other cost items specific to landfill operations such as the costs of the gas collection system, leachate treatment and disposal, groundwater monitoring and post closure. In addition, information on revenues, costs savings and potential region-specific cost drivers, either quantitative or qualitative, was requested.

Table 7.2.1. below summarizes the cost data obtained with the data collection survey as of the date of this memorandum.

Table 7.2.1. Data Obtained for Landfills.

Category Description (1)	Low Range	Average	High Range	Comments
Annual Tons Landfill Waste Processed	420,000	1,720,000	3,850,000	
Operating Revenues/ Ton of Landfill Waste	$25	$32	$39	
Total Revenues/ Ton of Landfill Waste	$32	$35	$39	Includes revenues from tip fees and energy sales.
Operating Cost/Ton of Landfill Waste (2)	$27	$41	$53	Key drivers include labor, depreciation, maintenance, taxes and facility and equipment leases.
Annual Equipment Expenditure/ Ton of Landfill Waste	n/a	$1	n/a	Based on data provided by one facility.
Annual Facility Improvement and Upgrades/Ton of Landfill Waste	n/a	$3	n/a	Based on data provided by one facility.
Annual Replacements/ Ton of Landfill Waste	n/a	$1	n/a	Based on data provided by one facility.

Notes:
(1) Based on information obtained from four facilities, three reported two years of data; one reported one year of data for a total of seven years worth of data.
(2) Operating costs per ton exceed revenues per ton for five out of seven of the years reported.
n/a = not available.

Detailed economic data from the four facilities that provided data can be found in Appendix E.

8 Data Uncertainties and Limitations

This memorandum reflects the status of the results obtained to date with the data collection survey, which are subject to change if additional data is received from the facilities

contacted. The data received have been fully analyzed and facilities that provided data have been contacted with follow-up questions as relevant. It is expected that many of the data gaps, after all the survey data have been received, will be filled using publicly available data. The main limitation of using publicly available data will be our ability to capture and characterize any differences across the study regions. This will be closely monitored and reported as we start obtaining the LCA and economic results.

At this point in the project, we have a better understanding of the data gaps that need to be filled with the publicly available sources. An important part of the LCA and economic analysis includes the identification and quantification of offsets and benefits of diverting organics and recyclables to various management strategies. This type of information was requested in the survey, but few facilities provided data. This data collection process is also collecting information to be used in part for the economic analysis of direct and indirect impacts of the various organics and management scenarios on economies of the three study regions and the state as a whole. Additional publicly available data to be used in this effort includes past studies completed by the project team for California and other states as well as sources that are yet to be identified.

PRELIMINARY COMPOSTING DATA ($NOMINAL)

		Facility A (1)	Facility A (1)	Facility B	Facility C
		(A)	(B)	(C)	(D)
1	**BUSINESS INFORMATION**				
2	Region (GLA, SCV, SBA, Outside)	Greater Los Angeles	Greater Los Angeles	Outside	Outside
3	Facility Status	Operational	Operational	Operational	Operational
4	System Type	Composting	Composting	Composting	Composting/C&G
5	Year of Data Provided	FY 2005 - 2006	FY 2006 - 2007	2006	FY 2007/2008
6	Commercial Operating Date	1994	1994	1997	1994
7	Number of Employees	n/a	n/a	n/a	8
8	Information Source	Survey	Survey	Survey	Survey
9					
7	**TOTAL TONNAGE**				
8	Annual Tonnage	197,820	194,267	64,778	36,917
9	Estimated TPD (2)	634	623	208	118
10					
11	**REVENUES**				
12	Revenue from Operations				
13	Organic Waste Gate Fee	$296,754	$92,145	$0	$475,126
14	Cogeneration Fuel Sales	65,167	134,179	0	0
15	Compost	73,826	108,225	0	69,131
16	Other Green Products	23,326	27,768	0	0
17	Other - State Grant	0	280,000	0	0
18	Other Revenues	0	0	0	0
19	Total Revenues	$459,073	$642,317	$1,150,000	$544,257
20					
21	Unit Revenues ($/Ton)				
22	Operating Revenue	$2	$0.5	n/a	$13
23	Total Revenue	$2	$3	$18	$15
24					
25	**OPERATING EXPENSES**				
26	Direct Labor	$1,406,572	$1,346,136	$325,000	n/a
27	Contract Labor	0	0	65,000	n/a
28	Benefits	621,085	610,919	100,000	n/a
29	Electricity	9,637	13,320	3,500	n/a
30	Water	84,711	62,322	0	n/a
31	Sewer	0	0	1,200	n/a
32	Utility: Other	1,765	1,867	1,900	n/a
33	Lease Payments	0	0	152,000	n/a
34	Contract Payments	0	0	0	n/a
35	Public Education	0	0	4,000	n/a
36	Disposal	0	0	0	n/a
37	Supplies	90,589	51,307	2,500	n/a
38	Depreciation	0	0	0	n/a
39	Insurance	29,700	37,932	7,500	n/a
40	Debt Service *(Principal and Interest Payments)*	0	0	82,000	n/a
41	Maintenance	0	0	142,000	n/a
42	Fuel	0	0	95,000	n/a
43	Property Taxes	0	0	0	n/a
44	Facilities and Equipment Rent or Lease	2,068,423	2,134,182	18,000	n/a
45	Other Equipment	0	17,786	0	n/a
46	Security	0	0	0	n/a
47	General Overhead/Administrative Costs	574,376	664,866	0	n/a
48	Transportation Costs	0	0	0	n/a
49	Other Costs	0	0	0	n/a
50	Total Expenditures	$4,886,858	$4,940,637	$999,600	$872,772
51					
52	Unit Costs ($/Ton)				
53	Operating Expenditures	$25	$25	$15	$24
54					

PRELIMINARY COMPOSTING DATA ($NOMINAL)

		Facility A (1) (A)	Facility A (1) (B)	Facility B (C)	Facility C (D)
55	**TOTAL FACILITY INVESTMENT**	n/a	n/a	n/a	n/a
56					
57	**ANNUAL EQUIPMENT EXPENDITURES**	$380,287	$1,279,770	n/a	n/a
58					
59	**ANNUAL FACILITY IMPROVEMENTS/UPGRADES**	$764,607	$252,174	n/a	n/a (3)
60					
61	**ANNUAL REPLACEMENTS**	n/a	n/a	n/a	n/a
62					
63	Unit Costs ($/Ton) - Capital Costs				
64	Total Facility Investment	n/a	n/a	n/a	n/a
65	Annual Equipment Expenditures	$2	$7	n/a	n/a
66	Annual Facility Improvements/Upgrades	4	1	n/a	n/a
67	Annual Replacements	n/a	n/a	n/a	n/a

Notes:
(1) Facility A provided data for FY 2005 - 2006 and FY 2006 - 2007.
(2) Based on 6 operating days per week.
(3) Included in the operating expenses.

PRELIMINARY RECYCLING DATA ($NOMINAL)

		Facility A	Facility B	Facility C (1)	Facility C (1)	Facility D (1)	Facility D (1)
		(A)	(B)	(C)	(D)	(E)	(F)
1	**BUSINESS INFORMATION**						
2	Region (GLA, SCV, SBA, Outside)	Southern Bay Area	Southern Bay Area	Greater Los Angeles	Greater Los Angeles	Greater Los Angeles	Greater Los Angeles
3	System Type	Multi-Material MRF	Multi-Material MRF	Multi-Material MRF	Multi-Material MRF	Multi-Material MRF	Multi-Material MRF
4	Year of Data Provided	FY 2006	2006	FY 2006	FY 2007	FY 2006	FY 2007
5	Commercial Operating Date	1994 and 2001	n/a	2005	2005	1988	1988
6	Number of Employees	113	32	n/a	n/a	32 Full-Time (2)	32 Full-Time (2)
7	Information Source	Survey	Survey	Annual Report (3)	Survey	Annual Report (3)	Annual Report (3)
8							
9	**TOTAL TONNAGE**						
10	Annual Tonnage	263,596	19,152	80,000	100,000	340,000	280,000
11	Estimated TPD (4)	922	67	280	350	1,189	979
12							
13	**REVENUES**						
14	Revenue from Operating Revenues (Tipping Fees)	$0	$0	$1,795,916	$2,435,087	$12,291,988	$9,664,373
15	Material Sales	1,577,579	1,847,580	457,919	898,823	1,893,238	2,583,997
16	Other Revenues	0	2,007,230	2,370	0	18,524	13,857
17	Total Revenues	$1,577,579	$3,854,810	$2,256,205	$3,333,910	$14,203,750	$12,262,227
18							
19	Unit Revenues ($/Ton)						
20	Operating Revenue	n/a	n/a	$22	$24	$36	$35
21	Total Revenue	$6	$201	$28	$33	$42	$44
22							
23	**OPERATING EXPENSES**						
24	Direct Labor	$0	$838,789	$1,933,105	$1,676,283	$2,367,550	$2,374,364
25	Indirect Labor	0	0	0	0	0	0
26	Contract Labor	0	0	0	0	0	0
27	Benefits	0	383,936	0	0	0	0
28	Electricity	0	24,214	0	0	0	0
29	Water	0	3,584	0	0	0	0
30	Sewer	0	0	0	0	0	0
31	Utility: Other	0	1,023,734	0	0	0	0
32	Utility: Total	0	0	99,909	28,519	115,595	124,105
33	Lease Payments	0	12	0	0	0	0
34	Contract Payments	9,838,650	1,051,200	0		0	0
35	Public Education	0	5,614	0	0	0	0
36	Disposal	9,746,418	0	0	0	0	0
37	Supplies	0	134,477	215,672	66,756	91,039	107,973
38	Depreciation	0	0	1,089,816	1,277,301	1,074,253	1,030,225
39	Insurance	0	56,794	36,174	37,980	77,726	45,420
40	Debt Service *(Principal and Interest Payments)*	1,858,568	0	0	0	0	0
41	Maintenance	309,938	90,516	320,323	345,047	834,829	702,821
42	Fuel	0	13,855	0	0	0	0
43	Taxes	0	0	0	0	687,335	486,922
44	Facilities and Equipment Rent or Lease	0	8,266	47,219	61,761	768,075	731,900
45	Other Equipment	0	0	0	0	0	0
46	Security	0	11,510	0	0	0	0
47	General Overhead/Administrative Costs	341,883	147,604	0	0	0	0
48	Transportation Costs	0	105,663	0	0	0	0
49	Services	0	0	2,876,424	3,983,672	9,422,030	8,587,257
50	Other Costs	729,684	0	4,645	3	0	41
51	Total Expenditures	$22,825,141	$3,899,768	$6,623,287	$7,477,322	$15,438,432	$14,191,028
52							
53	Unit Costs ($/Ton)						
54	Operating Expenditures	$87	$204	$83	$75	$45	$51
55							

PRELIMINARY RECYCLING DATA ($NOMINAL)

		Facility A	Facility B	Facility C (1)	Facility C (1)	Facility D (1)	Facility D (1)
		(A)	(B)	(C)	(D)	(E)	(F)
56	**TOTAL FACILITY INVESTMENT**						
57	Amount ($Nominal)	$25,000,000	$2,500,000	n/a	$47,345,663	$22,500,000	n/a
58	Year of Investment	1993/1994	2000	n/a	2005	1997/2003	n/a
59							
60	**ANNUAL EQUIPMENT EXPENDITURES (5)**	$450,000	$75,000	n/a	n/a	n/a	n/a
61							
62	**ANNUAL FACILITY IMPROVEMENTS/UPGRADES (6)**	n/a	$175,000	n/a	n/a	n/a	n/a
63							
64	**ANNUAL REPLACEMENTS**	n/a	n/a	n/a	n/a	n/a	n/a
65							
66	Unit Costs ($/Ton) - Capital Costs						
67	Total Facility Investment	$95	$131	n/a	$473	$66	n/a
68	Annual Equipment Expenditures	2	4	n/a	n/a	n/a	n/a
69	Annual Facility Improvements/Upgrades	n/a	9	n/a	n/a	n/a	n/a
70	Annual Replacements	n/a	n/a	n/a	n/a	n/a	n/a

Notes:
(1) Facility C and Facility D provided data for FY 2006 and FY 2007.
(2) Number of Employees at Facility D: 32 Full-Time/36 Contract Sorters
(3) Provided by agency.
(4) Assumes 5.5 operating days per week.
(5) Annual equipment expenditures for Facility B average between $0 and $150,000.
(6) Annual facility improvements/upgrades average between $100,000 and $250,000 for Facility B.

PRELIMINARY ANAEROBIC DIGESTION DATA ($NOMINAL)

		Facility A	Facility B
		(A)	(B)
1	**BUSINESS INFORMATION**		
2	Region (GLA, SCV, SBA, Outside)	Southern Bay Area	Outside
3	Facility Status	Operational - Pilot	Operational - Pilot
4	System Type	Anaerobic Digestion (1)	Anaerobic Digestion (1)
5	Year of Data Provided	Estimated	2012
6	Commercial Operating Date	n/a	n/a
7	Number of Employees	287	n/a
8	Information Source	Survey	Report (2)
9			
10	**TOTAL TONNAGE**		
11	Annual Tonnage	26,000	35,880
12	Estimated TPD (3)	100	115
13			
14	**REVENUES**		
15	Revenue from Operating Revenue (Tipping Fees)	$845,000	$1,130,220
16	Other Revenues	0	0
17	Energy Revenues	561,600	763,800
18	Total Revenues	$1,406,600	$1,894,020
19			
20	Unit Revenues ($/Ton)		
21	Operating Revenue	$33	$32
22	Total Revenue	$54	$53
23			
24	**OPERATING EXPENSES**		
25	Direct Labor	n/a	n/a
26	Indirect Labor	n/a	n/a
27	Contract Labor	n/a	n/a
28	Benefits	n/a	n/a
29	Electricity	n/a	n/a
30	Water	n/a	n/a
31	Sewer	n/a	n/a
32	Utility: Other	n/a	n/a
33	Lease Payments	n/a	n/a
34	Contract Payments	n/a	n/a
35	Public Education	n/a	n/a
36	Disposal	n/a	n/a
37	Supplies	n/a	n/a
38	Depreciation	n/a	n/a
39	Insurance	n/a	n/a
40	Debt Service *(Principal and Interest Payments)*	n/a	n/a
41	Maintenance	n/a	n/a
42	Fuel	n/a	n/a
43	Property Taxes	n/a	n/a
44	Facilities and Equipment Rent or Lease	n/a	n/a
45	Other Equipment	n/a	n/a
46	Security	n/a	n/a
47	General Overhead/Administrative Costs	n/a	n/a
48	Transportation Costs	n/a	n/a
49	Other Costs	n/a	n/a
50	Total Expenditures	n/a	$800,000
51			
52	Unit Costs ($/Ton)		
53	Operating Expenditures	n/a	$22
54			

PRELIMINARY ANAEROBIC DIGESTION DATA ($NOMINAL)

		Facility A	Facility B
		(A)	(B)
55	**TOTAL FACILITY INVESTMENT**		
56	Amount ($Nominal)	$4,000,000	$10,200,000
57	Year of Investment	Various (4)	2012
58			
59	**ANNUAL EQUIPMENT EXPENDITURES**	n/a	n/a
60			
61	**ANNUAL FACILITY IMPROVEMENTS/UPGRADES**	n/a	n/a
62			
63	**ANNUAL REPLACEMENTS**	n/a	n/a
64			
65	Unit Costs ($/Ton) - Capital Costs		
66	Total Facility Investment	$154	$284
67	Annual Equipment Expenditures	n/a	n/a
68	Annual Facility Improvements/Upgrades	n/a	n/a
69	Annual Replacements	n/a	n/a

Notes:
(1) The substrate for these facilities is food waste.
(2) Source: CIWMB Strategy Goals Table.doc and conversations with report author.
(3) Facility A estimates 260 operating days per year and Facility B assumes 312 operating days per year where food waste is accepted.
(4) Investment in infrastructure occurred over multiple years. Approximately $3,000,000 was invested between 2004 and 2009, and another $1,000,000 will be spent by April 2009 to improve system reliability.

PRELIMINARY BIOMASS-TO-ENERGY DATA ($NOMINAL)

		Facility A
		(A)
1	**BUSINESS INFORMATION**	
2	Region (GLA, SCV, SBA, Outside)	Outside
3	Facility Status	Operational
4	System Type	BTE
5	Year of Data Provided	2006
6	Commercial Operating Date	1989
7	Number of Employees	23
8	Information Source	Survey
9		
10	**TOTAL TONNAGE**	
11	Annual Tonnage	106,891
12	Estimated TPD (1)	333
13		
14	**REVENUES**	
15	Revenue from Operations	$0
16	Other Revenues	4,056,531
17	Energy Revenues	8,933,955
18	Total Revenues	$12,990,486
19		
20	Unit Revenues ($/Ton)	
21	Operating Revenue	n/a
22	Total Revenue	$122
23		
24	**OPERATING EXPENSES**	
25	Direct Labor	$1,099,420
26	Indirect Labor	352,780
27	Contract Labor	868,000
28	Benefits	890,058
29	Electricity	111,580
30	Water	58,000
31	Sewer	0
32	Utility: Other	42,604
33	Lease Payments	0
34	Contract Payments	0
35	Public Education	0
36	Disposal	93,966
37	Supplies	0
38	Depreciation	1,012,656
39	Insurance	238,517
40	Debt Service *(Principal and Interest Payments)*	0
41	Maintenance	3,103,000
42	Fuel	5,258,519
43	Property Taxes	247,467
44	Facilities and Equipment Rent or Lease	10,000
45	Other Equipment	0
46	Security	5,000
47	General Overhead/Administrative Costs	257,321
48	Transportation Costs	0
49	Other Costs	0
50	Total Expenditures	$13,648,888
51		
52	Unit Costs ($/Ton)	
53	Operating Expenditures	$128
54		

PRELIMINARY BIOMASS-TO-ENERGY DATA ($NOMINAL)

		Facility A (A)
55	**TOTAL FACILITY INVESTMENT**	n/a
56		
57	**ANNUAL EQUIPMENT EXPENDITURES**	n/a
58		
59	**ANNUAL FACILITY IMPROVEMENTS/UPGRADES**	n/a
60		
61	**ANNUAL REPLACEMENTS**	n/a
62	Unit Costs ($/Ton) - Capital Costs	
63	Total Facility Investment	n/a
64	Annual Equipment Expenditures	n/a
65	Annual Facility Improvements/Upgrades	n/a
66	Annual Replacements	n/a

Notes:
(1) Based on 321 operating days per year.

PRELIMINARY LANDFILL DATA ($NOMINAL)

		Facility A (1)	Facility A (1)	Facility B (1)	Facility B (1)	Facility C (1)	Facility C (1)	Facility D (3 Facilities)
		(A)	(B)	(C)	(D)	(E)	(F)	(G)
1	**BUSINESS INFORMATION**							
2	Region (GLA, SCV, SBA, Outside)	Greater Los Angeles	Greater Los Angeles	Greater Los Angeles	Greater Los Angeles	Greater Los Angeles	Greater Los Angeles	Greater Los Angeles
3	Facility Status	Operational	Operational	Operational	Operational	Operational	Operational	Operational
4	System Type	Landfill/C&G	Landfill/C&G	Landfill/C&G	Landfill/C&G	Landfill	Landfill	Landfill
5	Year of Data Provided	FY 2006	FY 2007	FY 2006	FY 2007	FY 2006	FY 2007	2006
6	Commercial Operating Date	n/a	n/a	n/a	n/a	n/a	n/a	1960, 1976, 1990
7	Number of Employees	n/a	n/a	n/a	n/a	n/a	n/a	275
8	Information Source	Annual Report (2)	Annual Report (2)	Annual Report (2)	Annual Report (2)	Annual Report (2)	Annual Report (2)	Survey (3)
9								
10	**TOTAL TONNAGE**							
11	Annual Tonnage	3,850,000	3,840,000	550,000	480,000	450,000	420,000	3,642,677
12	Estimated TPD (4)	12,340	12,308	1,763	1,538	1,442	1,346	11,675
13								
14	**REVENUES**							
15	Revenue from Operations	$96,022,638	$101,347,747	$17,872,040	$16,206,846	$17,220,829	$16,257,353	$103,099,464
16	Other Revenues	217,899	401,091	81	28,368	0	17,505	23,763,716
17	Sale of Energy	31,997,102	34,281,260	0	0	0	0	0
18	Total Revenues	$128,237,639	$136,030,098	$17,872,121	$16,235,214	$17,220,829	$16,274,858	$126,863,180
19								
20	Unit Revenues ($/Ton)							
21	Operating Revenue	$25	$26	$32	$34	$38	$39	$28
22	Total Revenue	$33	$35	$32	$34	$38	$39	$35
23								
24	**OPERATING EXPENSES**							
25	Direct Labor	$15,513,642	$17,123,479	$4,083,719	$3,629,582	$3,203,155	$3,299,838	$10,004,544
26	Indirect Labor	0	0	0	0	0	0	5,365,664
27	Contract Labor	0	0	0	0	0	0	41,708
28	Benefits	0	0	0	0	0	0	6,895,380
29	Electricity	0	0	0	0	0	0	205,523
30	Water	0	0	0	0	0	0	207,608
31	Sewer	0	0	0	0	0	0	608,640
32	Utility: Other	0	0	0	0	0	0	183,203
33	Utility: Total	1,165,014	1,552,314	405,870	489,181	296,469	325,872	0
34	Lease Payments	0	0	0	0	0	0	0
35	Contract Payments	0	0	0	0	0	0	0
36	Public Education	0	0	0	0	0	0	28,573
37	Disposal	0	0	0	0	0	0	0
38	Supplies	1,337,362	1,313,207	217,679	201,220	217,874	131,770	655,530
39	Depreciation	12,619,824	16,459,428	12,379,050	8,447,208	2,289,500	1,078,952	14,547,197
40	Insurance	998,354	2,365,048	785,397	173,506	(391,094)	47,726	265,075
41	Debt Service *(Principal and Interest Payments)*	0	0	0	0	0	0	7,645,666
42	Maintenance	12,912,958	13,806,820	1,766,130	1,546,369	1,297,681	1,087,366	7,607,135
43	Fuel	0	0	0	0	0	0	2,669,662
44	Taxes	25,250,001	21,505,169	2,761,918	1,758,942	4,782,579	2,988,994	5,282,060
45	Facilities and Equipment Rent or Lease	12,433,331	13,385,766	2,895,510	2,052,345	1,935,416	2,242,967	739,810
46	Other Equipment	0	0	0	0	0	0	0
47	Security	0	0	0	0	0	0	102,505
48	General Overhead/Administrative Costs	0	0	0	0	0	0	11,335,515
49	Leachate Treatment/Disposal	0	0	0	0	0	0	494,223
50	Landfill Gas System Operation	0	0	0	0	0	0	2,372,819
51	Groundwater Monitoring Costs	0	0	0	0	0	0	261,801
52	Chemicals	346,247	303,426	18,866	8,417	0	6,206	0
53	Other Costs	0	0	0	0	4,800,078	4,802,627	42,789,948
54	Transportation Costs	0	0	0	0	0	0	0
55	Services	11,334,047	15,445,591	1,208,888	1,121,190	1,047,195	999,442	0
56	Closure and Post-Closure Costs	9,124,135	35,449,240	2,397,719	3,950,539	567,871	588,084	1,715,652
57	Total Expenditures	$103,034,915	$138,709,488	$28,920,746	$23,378,499	$20,046,724	$17,599,844	$122,025,441

PRELIMINARY LANDFILL DATA ($NOMINAL)

		Facility A (1)	Facility A (1)	Facility B (1)	Facility B (1)	Facility C (1)	Facility C (1)	Facility D (3 Facilities)
		(A)	(B)	(C)	(D)	(E)	(F)	(G)
58								
59	Unit Costs ($/Ton)							
60	Operating Expenditures	$27	$36	$53	$49	$45	$42	$33
61								
62	**TOTAL FACILITY INVESTMENT**	n/a	n/a	n/a	n/a	n/a	n/a	n/a
63								
64	**ANNUAL EQUIPMENT EXPENDITURES**	n/a	n/a	n/a	n/a	n/a	n/a	$4,697,821
65								
66	**ANNUAL FACILITY IMPROVEMENTS/UPGRADE**	n/a	n/a	n/a	n/a	n/a	n/a	$10,454,037
67								
68	**ANNUAL REPLACEMENTS**	n/a	n/a	n/a	n/a	n/a	n/a	$5,328,842
69								
70	Unit Costs ($/Ton) - Capital Costs							
71	Total Facility Investment	n/a	n/a	n/a	n/a	n/a	n/a	n/a
72	Annual Equipment Expenditures	n/a	n/a	n/a	n/a	n/a	n/a	$1
73	Annual Facility Improvements/Upgrades	n/a	n/a	n/a	n/a	n/a	n/a	3
74	Annual Replacements	n/a	n/a	n/a	n/a	n/a	n/a	1

Notes:
(1) Facility A, Facility B and Facility C provided data for FY 2006 and FY 2007.
(2) Provided by agency.
(3) Survey provided information for the agency's three facilities.
(4) Assumes six operating days per week.

PRELIMINARY COMPOSTING LCA DATA

		Facility A	Facility B	Facility C
1	**BUSINESS INFORMATION**			
2	Region (GLA, SCV, SBA, Outside)	Greater Los Angeles	Outside	Outside
3	Facility Status	Operational	Operational	Operational
4	System Type	Composting	Composting	Composting/C&G
5	Year of Data Provided	FY 2005 - 2006	2006	FY 2007/2008
6	Commercial Operating Date	1994	1997	1994
7	Number of Employees	n/a	n/a	8
8	Information Source	Survey	Survey	Survey
9				
7	**TOTAL TONNAGE**			
8	Annual Tonnage	197,820	64,778	36,917
9	Estimated TPD (1)	634	208	118
10				
11	**OPERATIONAL CHARACTERISTICS**			
12	Materials Accepted	Yard trimmings, leaves, grass, wood pallets, brush, sawdust, non-treated C&D wood, presswood, clean wood shingles, particle board, horse manure, root balls, tree trunks, branches	Residential yard waste (grass, leaves, brush, food waste and paper), city forestry trees, brush & leaves	Curbside collected greenwaste, self-haul commercial and residential greenwaste; self-haul commercial and residential wood waste and C&D lumber.
13	Annual Amount of Throughput Tons Collected	FY 2006: 197,820 FY 2007: 194,267	64,778 tons of yard trimmings	Total: 36,917 tons Wood waste: 3,821 tons Woody waste (brush): 5,936 tons Green waste: 25,999 tons Rejected green waste: 1,161 tons sent to LF
14	Estimated Annual Tons of Residual Waste	n/a	6,400 tons (10%)	2,821 tons of screen covers used as ADC (8%)
15	Compost Residence Time (days)	n/a	Seasonal, 90 to 365 days	3 months
16	Compost Pile Turning Frequency (days)	n/a	Every 5 days	3 times per week
17	Curing Stage Residence Time (days)	n/a	90	1 to 3 months
18				
19	**EQUIPMENT ELECTRICITY AND FUEL REQUIREMENTS**			
	Windrow Turner			
20	Engine (HP)	n/a	435	425
	Fuel Usage (gal/hr)	n/a	550 gal/month	9.27
	Fuel	n/a	n/a	Diesel
21	Hammermill			
22	Engine (HP)	n/a	1050	n/a
	Fuel Usage (gal/hr)	n/a	1,000 gal/month	9.99 gal/hr
	Fuel	n/a	n/a	Diesel
23	Pre-Trommel			
24	Engine (HP)	n/a	97	n/a
	Fuel Usage (gal/hr)	n/a	220 gal/month	2.74
	Fuel	n/a	n/a	Diesel
25	Front End Loader			
26	Engine (HP)	n/a	2 x 232	a. 149 and b. 160
	Fuel Usage (gal/hr)	n/a	n/a	a. 2.58 and b. 3.27
	Fuel	n/a	Diesel	Diesel
27	Bobcat	n/a	n/a	n/a
28	Post-Trommel	n/a	n/a	n/a
29	Odor Control	n/a	n/a	n/a
30	Building Operation	n/a	n/a	n/a
31				
32	**ESTIMATED FINISHED PRODUCTS**			
33	Annual Amount of Finished Products	n/a	32,250 tons compost	10,976 y^3 wood chips 9,247 y^3 compost
34	Customers of Finished Products	n/a	Farmers, landscapers, wholesale/retail, gardeners	Homeowners, landscapers, farmers
35	Cost Savings and/or Benefits	n/a	Water holding capacity, soil structure, porosity, density	Unknown

Notes:
(1) Based on 6 operating days per week.

PRELIMINARY CHIPPING/GRINDING LCA DATA

		Facility A	Facility B	Facility C
1	**BUSINESS INFORMATION**			
2	Region (GLA, SCV, SBA, Outside)	Greater Los Angeles	Greater Los Angeles	Outside
3	Facility Status	Operational	Operational	Operational
4	System Type	Landfill/C&G	Landfill/C&G	Composting/C&G
5	Year of Data Provided	FY 2006	FY 2006	FY 2007/2008
6	Commercial Operating Date	n/a	n/a	1985
7	Number of Employees	n/a	n/a	n/a
8	Information Source	Survey, Annual Report	Survey	Survey
9				
10	**TOTAL TONNAGE**			
11	Annual Tonnage	3,850,000	550,000	28,820
12	Estimated TPD (1)	12,340	1,763	92
13				
14	**OPERATIONAL CHARACTERISTICS**			
15	Type of Materials Accepted	Only clean loads of brush, tree trimmings, grass and certain other yard wastes	Only clean loads of brush, tree trimmings, grass and certain other yard wastes	n/a
16	Annual Amount of Throughput Tons Collected	352, 404	57,200	28,280
17	Estimated Annual Tons of Residual Waste	n/a	n/a	n/a
18				
19	**EQUIPMENT OPERATING PARAMETERS**			
20	Number of Tub Grinders	n/a	n/a	n/a
21	Tub Grinder Energy Requirements	n/a	n/a	n/a
22				

Notes:
(1) Based on 6 operating days per week.

PRELIMINARY RECYCLING LCA DATA

		Facility A	Facility B	Facility C	Facility D
1	**BUSINESS INFORMATION**				
2	Region (GLA, SCV, SBA, Outside)	Southern Bay Area	Southern Bay Area	Greater Los Angeles	Greater Los Angeles
3	System Type	Multi-Material MRF	Multi-Material MRF	Multi-Material MRF	Multi-Material MRF
4	Year of Data Provided	FY 2006	2006	FY 2006	FY 2006
5	Commercial Operating Date	1994 and 2001	n/a	2006	1988
6	Number of Employees	113	32	n/a	32 Full-Time
7	Information Source	Survey	Survey	Survey	Survey
8					
9	**TOTAL TONNAGE**				
10	Annual Tonnage	263,596	19,152	80,000	340,000
11	Estimated TPD (1)	922	67	280	1,189
12					
13	**OPERATIONAL CHARACTERISTICS**				
14	Waste Streams	MSW, dual-stream source separated recyclables (fiber,containers), single-stream commercial recyclables, yard trimmings	Buyback and drop-off centers are source separated. Residential and commercial are dual stream (containers and paper).	Clean loads containing brush, tree trimmings, grass and certain other yard waste	Single-stream curbside recyclables through MRF; C&D floor sort from mixed waste; MSW in transfer station
15	Annual Quantity of Major Materials Collected				
16	Paper (tons)	24,052	14,024	n/a	86.25
17	Glass (tons)	3,749	3,344	n/a	11.9
18	Metal (tons)	849	1,438	n/a	38.71
19	Plastic (tons)	1,530	346	n/a	18
20	C&D (tons)	13,649	n/a	n/a	61.25
21	Organics (tons)	30,970	n/a	n/a	n/a
22	Annual Amount of Specific Materials Collected				
23	Paper (tons)	OCC: 6,491 ONP: 4,949 Office: none Mixed: 12,612	OCC: 2,658 ONP: 9,311 Office: none Mixed: 1,983	n/a	OCC: 36.25 ONP: 25 Chipboard: 2.9 Mixed: 22.9
24	Glass (tons)	Clear: 863 Brown: 327 Green: 732 Mixed: 1,827	Clear: 947 Brown: 844 Green: 922 Mixed Broken: 631	n/a	Clear: 6.21 Brown: 2.84 Green: 2.84
25	Metal (tons)	Al Cans: 159 Ferrous: 690	Al Cans: 147 Bi-metal: 1 Ferrous: 1,241 Non-Ferrous: 49	n/a	Al Cans: 0.41 Bi-Metal: 3.3
26	Plastic (tons)	HDPE (color): 888	PET: 222 HDPE Mixed: 124	n/a	PET: 4 HDPE (natural): 4.8 HDPE (colored): 6.15 #3 - #7: 3.00
27	C&D (tons)	Concrete: 4,042 Wood: 5,242 Ferrous: 4,344 Non-Ferrous: 21	none	n/a	Concrete/metal: 26.25 Wood: 35
28	Organics (tons)	Food: 5,506 Yard Waste: 25,464	none	n/a	none
29	Annual Tons of Residual Waste	MSW: 82% Source-separated Rec.: 8%	480, mostly film plastic and other non-recyclable plastics		
30	Separation Efficiencies	Single-stream or Source-separated Rec.: 100% C&D: Included in MSW	97.6%, single-stream	n/a	11%
31	Annual Energy Consumption (kWh/year)	Unknown	11,030	n/a	n/a
32					
33	**TRANSPORTATION**				
34	Average Distance Between Collection Sites and MRF (miles)	6	4	n/a	n/a
35	Average Distance Between MRF and LF for Residual Disposal (miles	27	0.13	n/a	n/a

Notes:
(1) Assumes 5.5 operating days per week.

PRELIMINARY ANAEROBIC DIGESTION LCA DATA

		Facility A	Facility B
1	**BUSINESS INFORMATION**		
2	Region (GLA, SCV, SBA, Outside)	SBA	Outside
3	Facility Status	Operational - Pilot	Operational - Pilot
4	System Type	Anaerobic Digestion (1)	Anaerobic Digestion (1)
5	Year of Data Provided	Estimated	2012
6	Commercial Operating Date	n/a	n/a
7	Number of Employees	287	n/a
10	Information Source	Survey	Report (2)
11			
12	**TOTAL TONNAGE**		
13	Annual Amount (tons/yr)	26,000	35,880
14	Estimated TPD (3)	100	115
15			
16	**OPERATIONAL CHARACTERISTICS**		
17	Collection Process Information	Commercial food waste is source separated and ground by haulers prior to delivery to facility. At the facility, the ground food waste is slurried with treated wastewater and processed through a paddle finisher to produce a pulp stream to be fed to the dig	Food waste
18	Estimated Annual Amount of Residuals Waste (tons/yr or gal/yr)	20%	n/a
19	Percent Total Solids	1) Food Waste to EBMUD: 20% to 40% 2) Reject: 15% to 30% 3) Digested/Dewatered Food Waste: ~21%	24%
20	Biological Volatile Solids Conversion Efficiency	80%	87% (2)
21	Energy Recovery Efficiency	Engine Efficiency: 30% (measured) Thermal Efficiency: 30% (estimated)	n/a
22	Material Recovery Rates	Paddle Finisher Reject: 50% to 90% Digested/Dewatered Food Waste: 80%	n/a
23	Power Produced for Internal Use (kWh/yr or percent)	None	11,390,399
24	Transportation Distance	Food waste varies based on hauler/source: 25 to 65 miles Reject: 57 miles to compost Digested/Dewatered Food Waste: 43 miles to ADC, 131 miles to land application, 57 miles to compost	n/a
25			
26	**ESTIMATED FINISHED PRODUCTS**		
27	Annual Amount of Biogas (m3/yr)	To be confirmed during pilot	6,160,886
28	Annual Amount of Compost (tons/year)	To be confirmed during pilot	7,748
29	Annual Amount of Liquid Nutrients	n/a	0, 100% reusable TS
30	Cost Savings and/or Benefits	n/a	Net efficiency of biogas to electricity = 30%, generator capacity factor = 90%; Residual TS recovery factor = 80%; residual solids moisture content = 65% w/w; usable fraction of recovered solids = 100%

Notes:
(1) The substrate for these facilities is food waste.
(2) Source: CIWMB Strategy Goals Table.doc and conversations with report author.
(3) Facility A estimates 260 operating days per year and Facility B assumes 312 operating days per year where food waste is accepted.

PRELIMINARY BIOMASS-TO-ENERGY LCA DATA

		Facility A
1	**BUSINESS INFORMATION**	
2	Region (GLA, SCV, SBA, Outside)	Outside
3	Facility Status	Operational
4	System Type	BTE
5	Year of Data Provided	2006
6	Commercial Operating Date	1989
7	Number of Employees	23
8	Expected Facility Life	2039
9	Annual Operating Hours	7,629
10	Annual Operating Days	321
11	Configuration	36 MW
12	Information Source	Survey
13		
14	**TOTAL TONNAGE**	
15	Annual Tonnage (a)	106,891
16	Estimated TPD (a)	333
17		
18	**OPERATIONAL CHARACTERISTICS**	
19	Composition of Accepted Biomass	
20	Forest Materials	46%
	Juniper Wood	30%
	Used Railroad Tie Material	20%
	Pallets and Clean Urban Wood Waste	3%
	Agricultural (Orchard) Debris	1%
21	Combustion Technology	Stoker-fired traveling grate furnace that can provide 300,000 lbs/hr or superheated steam; multi-cyclone dust collector, ESP
22	Type of Energy Produced	Steam T/G - electricity
23	Amount of Energy Produced/Offset (kWh/yr)	30,000
24	Amount of Electricity Produced Per Ton Biomass (kWh)	1,390
25	Annual Capacity Factor	n/a
26	Combustion System Efficiency	89%
27	Other Fuels Used in Addition to Biomass	Propane, about 1% of wood fuel demand; about 42,000 lbs
28	Ash Management	Fly ash used as soil amendment/fertilizer; Bottom ash landfilled
29	Current Available Capacity	120,000 tons/year
30	Projected Available Capacity	120,000 tons/year
31	Additional Information	Uses geothermal water (up to 550 gal/min) for condensate preheating; geothermal process also generates electricity by using geothermal fluid to heat secondary, working fluid (propane). Working fluid vaporizes at lower temperature than water and will driv

Notes:
(a) Assuming 321 operating days per year
T/G = turbine generator
EPC = electrostatic precipitator

PRELIMINARY LANDFILL LCA DATA

		Facility A	Facility B	Facility C	Facility D1	Facility D2	Facility D3	Facility E
1	**BUSINESS INFORMATION**							
2	Region (GLA, SCV, SBA, Outside)	GLA	GLA	GLA	GLA	GLA	GLA	SCV
3	Facility Status	Operational	Operational	Operational	Operational	Operational	Operational	Operational
4	System Type	Landfill/C&G	Landfill/C&G	Landfill	Landfill	Landfill	Landfill	Landfill
5	Year of Data Provided	FY 2006	FY 2006	FY 2006	2006	2006	2006	FY 2006
6	Commercial Operating Date	n/a	n/a	n/a	1960	1960	1990	2006
7	Number of Employees	n/a	n/a	n/a	275	275	275	22
8	Information Source	Survey, Annual Report	Annual Report	Annual Report	Survey	Survey	Survey	Survey
9								
10	**TOTAL TONNAGE**							
11	Annual Tonnage	3,850,000	550,000	450,000	1,925,936	2,129,124	650,552	519,336
12	Estimated TPD (2)	12,340	1,763	1,442	6,173	6,824	2,085	1,443
13								
14	**OPERATIONAL CHARACTERISTICS**							
15	Current Permitted Capacity (Tons)	n/a	n/a	n/a	8,000	8,500	4,000	53,000,000
16	Available Capactiy (Tons)	n/a	n/a	n/a	18,930,000	40,270,000	78,990,000	20,478,536
17	Landfill Life Expectancy (Date)	n/a	n/a	n/a	2021	2053	2067	2031
18	Total Annual Tons of ADC Used	n/a	n/a	n/a	341,542	129,378	128,803	12,614
19			n/a	n/a				
20	**GAS MANAGEMENT SYSTEM**		n/a	n/a				
21	Annual Amount of Gas Flared (ft3)	0	n/a	n/a	4,023,910,000	3,300,000,000	0	203,825,785
22	Annual Amount of Gas Vented (ft3)	1,157,196,106	n/a	n/a	0	0	0	0
23	Annual Amount of Gas Recovered (ft3)	15,860,393,683	n/a	n/a	870,670,000	0	0	0
24	Gas Collection System Efficiency	1	n/a	n/a	75.0%	75.0%	0	99.8%
25	Total Gas Yield Potential (ft3 gas/ton MSW)	2,011	n/a	n/a	4,400	4,400	0	n/a
26	Gas Quality - CO2	0	n/a	n/a	Flare: 41% Plant: 48%	39.73%	0	41.90%
27	Gas Quality - CH4	0	n/a	n/a	Flare: 47% Plant: 51%	45.80%	0	57.20%
28	Type of Energy Recovery System	Steam, turbine, gas turbine, ICEs	n/a	n/a	3 ICE, 5 MW for the grid	0	0	none
29	Cost Savings and/or Benefits	n/a	n/a	n/a	$350,000 per year from LFG	0	0	n/a
30								
31	**LEACHATE MANAGEMENT INFORMATION**		n/a	n/a				
32	Type of Liner	Un-lined areas, pre-subtitle-D liners, single and double composite liner for side slopes, and single liner for the floor.	n/a	n/a	Alternative liner and un-lined areas	Single composite liner	n/a	Single composite liner
33	Distance Leachate is Transported for Treatment (miles)	on-site	n/a	n/a	32	on-site	n/a	12.15

Notes:
(1) Facility A, Facility B and Facility C provided data for FY 2006 and FY 2007.
(2) Assumes six operating days per week.